MONTHLY WEATHER REVIEW,

SEPTEMBER, 1878.

WAR DEPARTMENT,

Office of the Chief Signal Officer,

DIVISION OF

TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.

INTRODUCTION.

In compiling the present REVIEW the following data, received up to September 14th, have been made use of, viz: the regular tri-daily weather charts, containing the data of simultaneous observations taken at 118 Signal Service stations and 12 Canadian stations, as telegraphed to this office; monthly journals and means, 141 and 121 respectively, from the former, and monthly means from 14 of the latter; reports from 18 special Sunset stations; 222 monthly registers from Voluntary Observers; 32 monthly registers from United States Army Post Surgeons; Marine Records; International Simultaneous Observations; monthly reports of the Weather Services of the States of Iowa and Missouri; reliable newspaper extracts; special reports.

BAROMETRIC PRESSURE.

Upon chart No. II is shown by the isobaric lines the general distribution of the atmospheric pressure, reduced to sea-level, for the month. Compared with the means for September of previous years, the pressure for the present month is generally higher east of the Mississippi river, and especially so in the Middle and Eastern States. The pressure is about normal in the Northwest and on the Pacific coast.

The Local Barometric Ranges, for the month, as reduced to sea level, have been largest from Kansas and Nebraska to the Lake region, and along a narrow belt of country, extending from Lake Ontario to Florida, in the course of storm area No. IV; taken by districts they vary as follows:—New England, 0.69 at Wood's Hole to 0.99 at Burlington, on summit of Mount Washington, 0.71; Middle Atlantic States, 0.42 at Norfolk to 0.94 at Washington; South Atlantic States, 0.59 at Cape Lookout to 1.02 at Jacksonville; Gulf States, 0.32 at Galveston to 0.47 at Mobile; Ohio valley and Tennessee, 0.41 at Nashville to 1.03 at Morgantown; Lower Lake region, 0.87 at Cleveland to 1.19 at Rochester; Upper Lake region, 0.93 at Chicago to 1.26 at Alpena; Upper Mississippi valley, 0.59 at St. Louis to 1.17 at St. Paul; Red River of the North valley, 1.05 at Pembina to 1.23 at Breckenridge; Missouri valley, 0.95 at Bismarck to 1.33 at Yankton; Plains of Nebraska and Kansas, 1.28 at Dodge City and 1.51 at North Platte; Rocky Mountain stations, 0.52 at Santa Fe to 0.86 at Denver; Utah, 0.66 at Salt Lake City; Idaho, 0.71 at Boise City; Nevada, 0.54 at Winnemucca and 0.57 at Pioche; California, 0.22 at Los Angeles to 0.37 at Red Bluff.

Areas of High Barometer.—Six have been sufficiently marked to merit a short description. They present some interesting features. Nos. I, III and VI entered the United States on the Pacific coast, moved in an easterly path over the Rocky Mountains, and thence to the Lake region, in all instances accompanied by general rain as soon as the colder northerly winds, due to the high pressure, began to under-run the warm southerly winds that had previously prevailed. Prior to these rains the dew-point in these regions had been high, but the relative humidity had been quite low. The greatest daily ranges in temperature occurred in advance of the passage of these high areas. High areas IV and V appear to have been due to the rise of the barometer in rear of low areas III and VIII, respectively. Developing in the Southwest they moved, with increasing pressure, in a northeasterly direction over Tennessee, Ohio valley and Lower Lake region, and thence to the New England and Middle Atlantic coast, and, at the approach of low areas from the west, were transferred, with diminishing pressure, to the Southern coast.

No. I.—2d, the barometer rose rapidly on the north Pacific coast in rear of low area No. III. 3d, the high pressure extended over Oregon, Nevada and Utah, accompanied by northwest winds, considerable fall in temperature and general but light rains. 4th and 5th, the highest barometer was transferred to the plateau lying north of the Platte river; in this region rain fell at every station after the shifting of the warm southerly winds to colder northerly.

No. II.—6th, the barometer rose rapidly in the St. Lawrence valley and Nova Scotia. 7th, this rising pressure continuing highest in Nova Scotia, extended over New England and the Middle States, giving rise on that day to a northeast storm on the New Jersey coast. 8th, this storm, with light but general rain, was transferred to the North Carolina coast, while the barometer was highest but falling in New England and Nova Scotia. 9th and 10th, the high area slowly diminishing was transferred to Nova Scotia, where it gradually rose on the 11th, but rapidly disappeared on 12th and 13th, with southerly winds, in advance of low barometer No. IV.

No. III.—6th and 7th, the barometer rose in Washington Ty. and Oregon, being generally more than 0.3 inches above normal. 8th, the pressure rose in Wyoming and Dakota, remaining highest above the normal in Idaho. On this day light rain generally fell west of the Missouri river, after the shifting of the winds to colder northerly due to the approach of this high pressure. 9th, the barometer rose most rapidly in the Northwest, but remained highest above the normal 0.33 inches in Utah. 10th and 11th, the highest barometer moved into the Northwest, Breckenridge being 0.41 inches above the normal, and the isobar of 30.40 included a great part of Minnesota and Dakota. 11th, 7.35 a. m., at this hour the highest barometer was in Minnesota and Wisconsin, while the pressure was everywhere unusually high in the United States, except near Savannah, Ga., where the cyclone of Sept. (1st–13th,) was entering the South Atlantic States. 12th, the high area remained nearly stationary in position, but situated between the cyclone of the (1st–13th,) and low barometer No. IV. approaching from the West; it disappeared as a high area during that and the succeeding day.

No. IV.—13th, the pressure was highest in the Southwest. 14th, the highest pressure slowly increasing, was transferred to Tennessee and the Ohio valley, where light frosts were generally reported in the morning. 15th, the high area moved into the Eastern and Middle States. 16th, light frosts in New England, and the pressure was highest along the coast. 17th, the high area slowly diminishing in pressure, was transferred to the South Atlantic States. 18th, remaining nearly stationary in position, it ceased, on that day, to be a high pressure. In its march over the country, within the isobars of high barometer, cool, clear weather, with light winds, prevailed.

No. V.—20th, there was a rapid rise in pressure from the Upper Lakes to Texas in rear of depression No. VIII. 21st, greatest rise in the Lake region, but the barometer was highest in Tennessee and the Ohio valley. 22d, the high area with increasing pressure moved into New England and the Middle States. The isobar of 30.40 including all New York. The pressure in this region was generally 0.4 inches above the normal. 23rd, the isobar of 30.50 included nearly all New York and New England. That day the highest pressure slowly diminishing with southeast winds was transferred to the New England coast. 24th and 25thth, slowly falling, the highest barometer extended along the coast from New York to Florida. 26th, still diminishing, it occupied the South Atlantic States. In the passage of this high area over the interior, clear weather prevailed, and frosts were generally reported in the Lower Lake region, New York and New England, but as the high pressure was transferred in a southwesterly direction along the coast, cloudy weather and light rain prevailed under the regime of cold northeast winds.

No. VI.—24th, there was a marked and general rise in pressure in the North Pacific States. 25th, this rise was transferred with unusual rapidity to the Northwest, where light rain, followed by clearing weather generally occurred after the shifting of the winds to colder northwest. 26th, the highest barometer, accompanied by clearing weather, moved into the Lake region. 27th, 7:35 a. m., the isobar 30.50 included most of the Lake region. Thence moving slowly to the eastward, the high area was (28th) in the Middle States and New England. 29th and 30th, diminishing with southeast winds in advance of low barometer No. XII, it occupied the coast states from Nova Scotia to the Carolinas.

Areas of Low Barometer.—Twelve are described, while only ten have their tracks charted. With the exception of No. IV, the charted tracks all lie to the north of latitude 41° N. The most memorable storm of the month, perhaps of the year, (No. IV,) presents all the characteristics of a tropical cyclone. Originating a short distance north of the equator, it pursued a path north of west until it reached, in Florida, latitude 30° N., when it began to curve to the north and east. Its charted track is a parabola, and in its southern branch it manifested the greatest energy and caused the most damage. Fortunately the diameter of the storm-area was quite limited, perhaps not much more than two hundred miles in extent, or greater disasters would have to be recorded. In the storm-centres moving over the northern portion of the chart, the most abundant rain fell, as a rule, after the passage of the centre of depression to the eastward.

Nos. I and II.—There were two depressions on the morning of the 1st, one in eastern Minnesota, the other in the Lower Lake region. Slowly approaching each other they became merged into a single depression by the morning of the 2nd in the Upper Lake region, and, during the day, this low area was filled up by inflowing air. 1st, occasional light rain fell in the Upper Lake region. 1st, 2nd, 3rd, frequent and heavy rains were reported in the Lower Lake region, Middle States and New England. The winds on the lakes were generally brisk, but not dangerous. During the night of the 3rd and 4th a terrific thunder-storm occurred near Scranton, Pa., which flooded two mines, swept away bridges and one person was drowned. The tracks of these depressions are too indefinite to be charted.

No. III—entered Oregon and Washington Territory on the 1st, moving easterly crossed the Rocky Mountains on the 2nd. 3rd, advanced into Dakota. 4th, was central in Minnesota. 5th and 6th, the barom-

eter remained low in the Northwest, but the centre of depression appears to have remained nearly stationary. The weather in advance of the centre was unusually clear and warm for the season. The maximum temperatures of the month for the region over which this depression moved, occurred at this time in advance of the centre, but cloudy weather, with general rain, prevailed in rear of the low after the winds had veered to colder northwesterly. Ship "Airlie," at San Francisco, September 4th, from Newcastle, NSW., reports strong NW. gale morning of September 3d. This was probably in rear of this depression.

No. IV.—This is the most interesting storm of the month, with respect to its origin, duration, length of path within the observation of this office, and destruction of life and property caused by it. On the midnight of the 1st and 2nd, it was central near the Island of Trinidad. As it passed this Island with considerable velocity for a tropical cyclone, it probably originated at a considerable distance to the eastward, perhaps south of the Cape Verde Islands and between 6° and 10° of N. latitude. At Trinidad the hurricane was the severest experienced for 40 years. The barometer 29.05, being the lowest reading recorded on the island. The hurricane began about 7 p. m., the 1st and continued to 4 p. m. of 2nd; it then abated for one hour, after which, the winds returned with greater violence for fifteen minutes. All vessels in harbor were badly wrecked, dwelling-houses, ware-houses, bridges etc., completely demolished, whole plantations swept away, and much damage done to cocoa cultivation. During its passage over Trinidad the winds veered from northwest to southwest. Seven inches of rain were measured by the gauge, and at various places in the island earthquake shocks were felt during the passage of the hurricane. 2nd, the Brig Typhoon from Port Spain, Trinidad to Boston was dismasted by this hurricane on the 2nd; position not given. The crew was rescued Sept. 7th, by the Steamship Hadji, which crossed the path of the hurricane as charted. The log of the Steamship Lotharingia from La Guayra, Venezuela to St. Thomas, shows it encountered the hurricane the night of the 2nd and 3rd, about latitude 15° N. and long 68½° W. 4th, the hurricane passed over Hayti and San Domingo, where it was very violent and destructive, doing most damage along the southern coast; at Port au Prince, buildings were entirely destroyed; at Jacmel a high sea did great damage to shipping and to wharves, entire coffee and cocoa crops destroyed; at Aux Cayes, in less than three hours 434 houses were destroyed by the violence of the wind, and a number of persons were killed and wounded; in the towns of Aquin and Cavaillon nearly every house destroyed and a large number of lives lost; at San Louis, La Grand Anse, Jeremie and Cavail, the sea swept nearly everything away. The following shipping was wrecked: at Jacmel Frigate Ozama, Bark Helen, Ship Serpent and two others; at Cavail, ship Wardwell; at Jeremie, several vessels. Entering Cuba, the midnight of the 4th and 5th, its track is thus traced over that Island by Padre Benito Vines, Director of the Meteorological Observatory of the Royal College of Bethlehem, at Havana. "The vortex of the hurricane entered the Island near Guantanamo, moving towards Puerto Principe, which was a short distance to the right of its path; thence it moved between Jucaro and Villa Clara. The latter place was so near the centre that it felt the calm of the vortex; finally it left the Island at a point east of Cardenas and a short distance from it." The following notes are extracted from the observations of the Signal Service Observer at Santiago de Cuba: 4th, 2 to 4.35 pm. rain at intervals, wind generally N. and NNW. 11 pm. clouds banked to E. and SE; very threatening, lightning, showers, barometer steady until 9.30, squally. 5th, hurricane commenced about midnight, (4th—5th) from NW. 1 a. m., blowing very hard from NW. 2 a. m., WNW. 3 a. m., SW. 4 a. m., S. Barometer 3 a. m., 29.49, (lowest); 3.20 a. m., 29.49; 3.40 a. m., 29.52; 5 a. m., 29.51; 7.35 a. m., 29.70. Winds, 7.35 a. m., SE, high, heavy squalls; 4.35 p. m., SE., 19; 11 p. m. SE., high and squally, wind all day from ESE., to SSE., fresh with squalls; torrents of rain, incessant after 9 a m. Although the centre of the storm left Cuba the night of the 6th–7th, yet the barometer continued low, especially in the western portions of the island until the 11th. The storm was here remarkable for the amount of rain that accompanied it. The inundations are reported greater and more destructive to property than ever before known. On the morning of the 6th, while the Cyclone was yet central in Cuba, special warning was sent to all Atlantic ports of the situation of this storm, and from that time until it had passed beyond Canada notice was frequently given of its position. 7th, the centre of the storm entered Florida, east of Key West. 8th, 9th and 10th it moved in a northerly track, very slowly, over the middle portions of this State. During the 9th and 10th, it was nearly stationary in latitude 30° N., preparatory to curving in its path to the east of north. Cautionary Signals were displayed at Key West on the 6th. the gale begining there the evening of that day, continued until the 11th. 7th, lowest barometer, 29.54, 3 p m; highest velocity 59 miles NW., 6.35 p m. 8th, barometer steady from 29.61 to 29.64, highest wind, 47 miles W. 9th, highest wind, 48 miles SW., at 10. 45 a m, and 4. 32 p m; barometer at end of day remaining steady at 29.51, or 29.52. 10th, barometer 29.43, 3 a m; 29.48, 7 a m; 29.44, 4 p m, then continued rising to end of the storm; highest wind 48 miles W., at 7. 05 a m, and SW., at 3 p m. 11th, the gale ended in the morning. Total rain fall, 4. 93 inches. The total movement of the air during the six days of the storm was over 4,000 miles. 7th, Signals were displayed in advance of this storm at St. Marks and Jacksonville, Fla, Tybee Island and Savannah, Ga., Charleston, S. C. Jacksonville, 7th, at night, wind fresh, NE., barometer steadily falling. 8th, wind brisk, NE., barometer falling. 10th, barometer continued falling; at midnight gale at its height, wind, NE., velocity 40 to 48 miles. 11th, gale ceased, lowest barometer 29. 23, 4 p m, five hours after gale had ended. Total rain fall 9. 78 inches. The vortex of the hurricane probably moved over Tybee Island.

Tybee Island, gale lasted from 7th to 12th. Highest wind 52 E. on 11th. Lowest barometer 29:33 7:45 a. m. on 12th. Total movement of air from 8th to 12th inclusive, 3,474 miles. Total rainfall 5.61 inches. During the afternoon of September 10th, the mate and four sailors of the German bark Tuiske

were drowned in attempting to leave the island in a ship's "long" boat. Savannah.—The gale lasted from the 8th to the 12th. Lowest barometer, 29.35 on the 12th. Highest wind, 42 miles E. on the 11th. Total rainfall, 4.64 inches. Near Savannah, great damage by floods and high tides was reported. The damage to rice crop in that vicinity is estimated from $300,000 to $400,000. The loss to the planters would have been much greater but for the attention paid to the Cautionary Signal displayed in that city. The following notes give data and casualties accompanying the southern branch of the storm: Bark Rebecca Caruana, from Mantanzas, Cuba, reports Sep. 9th, lat. 25° N., in Straits of Florida; took hurricane from SW. to S. and E., lasting three days, up to lat. 32° 30′ N.; had to keep heavy press of canvas to keep vessel from going ashore; decks completely flooded all the time. Bark L. T. Stocker arrived at Key West p. m. of the 6th; took pilot, but was compelled to anchor outside of bar on account of storm, and was blown to sea morning of the 7th; lost anchors, &c., and put into Savannah Sep. 14th. Bark Nueva Aurelia, from New Orleans to Rouen, put into Havana Sep. 8th, on account of heavy weather, with damage to mainmast. Brig Sabre, from Tampico to Havre, was driven ashore 60 miles S. of Cape Carnaveral in hurricane, total loss, one life lost. Schooner Jessie B. Smith, from Old Harbor, Ja., August 24th, for New York, was driven to Jacksonville bar September 10th, after 5 days continued gales; let go both anchors but was driven ashore 5 miles S of St. John's bar at day break of 11th, in hurricane so fierce that it blew the light house down. Schooner Chas. W. Lord, from Havana September 7th, to New Orleans put back to Havana September 10th, on account of heavy sea and head winds. Schooner Eulalia, (fallen in with September 4th, by ship Annie Goudey, from Cork to New Orleans September 23rd,) reported having been dismasted in hurricane September 3rd; September 4th, heavy gale. Schooner Hattie Ross, driven ashore 12 miles S of Cape Carnaveral. Brig Sallie Brown abandoned September 11th, 29.40 N., 80.40 W., dismasted and water logged; crew landed at New York September 23rd. Steamer City of New York, at Havana September 13th, from New York reports hurricane lasting 40 hours between Cape Hatteras and Charleston. Steamer Santiago de Cuba, at Havana September 14th, from New York, reports tremendous hurricane off Florida coast, lay to for four days off Cape Carnaveral. Schooner Ocean Pearl from San Blas, Baltimore, was totally wrecked 30 miles north of Cape Carnaveral in hurricane. 12th, in the afternoon the centre of the storm was in South Carolina. It should be stated here that a moderate northeast gale had set in on the 11th in the Lower Lake region after the passage of low barometer No. V, and which was probably due to the rising and high pressure north of the St. Lawrence valley. At 4:35 p. m. of the 12th the pressure in Nova Scotia was over 0.3 above the normal, and in the Lake Superior country about .25 above the normal with a region of lower pressure between. 12th, 11 p. m., a belt of low pressure extended to Lake Erie from the Carolina coast. 13th, 7:35 a. m., the lowest pressure was near Buffalo, and on this day the centre of the storm moved beyond the limits of the map; in addition to those already mentioned Cautionary Signals were ordered in advance of this cyclone, 11th, on the Atlantic coast, from Wilmington to Cape Henry; 12th, from Norfork to Eastport. The following maximum velocities are reported: Charleston, (Signal ordered on the 7th,) 44 miles E. on the 11th and SE. on the 12th. The total movement of the air for the twenty-four hours ending noon. September 12th, was 650 miles, the highest ever registered in that city. 12th, Smithville, 48 miles, SE. Wilmington, 30 miles, SE. Sloop Point, 65 miles, (estimated.) Cape Lookout, 75 miles, SE. Cape Hatteras, 50 miles, NE. 13th, Kittyhawk, 57 miles, NW. Cape Henry, 33 miles, NE. Cape May, 46, SE. Barnegat, 44, SE. Sandy Hook and New York, 40 miles, SE. Mt. Washington, 100 miles, S., and on the 14th, 100 miles, NW. Cautionary Signals were generally justified on the New England coast on the 13th. Cautionary Signals were ordered in advance of this storm in the Lake region from Oswego to Toledo on the 11th, and from Detroit to Alpena on the 12th. The following unusually high velocities are reported: 12th, Sandusky, 48 miles, NE.; 13th, Cleveland, 48 miles, W.; Erie, 35 miles, W.; Buffalo, 45 miles, SW.; Rochester, 30 miles, W. This storm is reported as being the severest known in the Lower Lake region for ten years; some say since 1844. Great disasters are reported from floods and the violence of the wind over the track of this storm from the South Atlantic coast to Lake Erie. These will be noted under the heading of floods and local storms.

No. V.—On the morning of the 7th a depression existed in Montana and Wyoming. Advancing eastward it was on the 8th in the Northwest; 9th it moved over the Lake Superior region, and thence pursued its path to the northeast, beyond the limits of our stations. The rain accompanying the depression was most frequent in the southwest quadrant occurring after the shifting of warm southerly winds to colder northwesterly. The rain-belt beginning in the Lower Missouri valley on the 9th, moved slowly to the east, reaching New England on the 11th. Cautionary Signals were ordered for Lakes Superior and Michigan on the 9th, and were generally justified.

No. VI—appeared on the evening of the 14th in southern Dakota. 15th it moved in a northeasterly path over Minnesota; clear weather, with warm southerly winds, prevailed that day in the states south of its track. 16th it moved slowly over Lake Superior. On this day occasional rain fell after the shifting of the wind to colder northwest. The winds accompanying the depression were generally light.

No. VII.—At the midnight report of the 16th a depression was developed in Manitoba, moving in a southeasterly track, the centre, at the 4:35 p. m. report of the 17th, was over Lake Michigan. At the midnight report the lowest pressure was between Rockliffe and Montreal, Canada. Thence moving in a northeasterly path, at the morning report of the 18th, the centre of low barometer was near the mouth of the St. Lawrence. The depression was only noticeable for the velocity of translation of its centre. The rain that accompanied it was only occasional and light, and generally north of the track of its centre. No high winds were reported.

No. VIII—appeared at the morning report of the 18th in Dakota—moved eastward into Minnesota; 19th, its centre passed over northern Wisconsin to Lake Huron; 20th, continued its easterly track north of the Lower Lakes, and 21st disappeared beyond the Gulf of St. Lawrence. Near the centre of the depression the pressure was generally 0.3 below the normal. Cautionary Signals were ordered in advance of this storm, on the 19th for Lakes Superior, Michigan and Huron, and on the 20th for Lake Erie. The Signals were justified on Lakes Michigan, Huron and Erie. At Grand Haven, 60 miles, NW., on the 19th, is the highest registered velocity occurring in the Lake region this season. The rain was frequent and abundant, but nearly all fell after the passage of the centre of depression. September 20th, Pentwater, (on Lake Michigan,) severe wind-storm—buildings damaged, one person killed. Sherman City, Isabella county, Michigan, "annihilated by terrible tornado, every building but one swept clean away," four persons injured. Coleman, Midland county, Mich., considerable damage done to trees and fences, one person injured. Thursday, Sept. 19th, Tawas, 50,000 feet of lumber blown into lake; 1,500 trees fell across Tawas and Southwestern railroad. Ogemaw Springs, tramways and smoke-stack blown down, mill, &c., damaged $1,500. Greenville, church blown down, one person killed. Sherman City, Isabella county, "sudden darkness, deathlike stillness, respiration difficult, and suddenly the tornado struck the place with indescribable force, lasting but a few seconds, sweeping every structure away, several persons injured—tornado seemed to be caused by meeting of two storms from NW. and SE., respectively."

No. IX—appeared on the the 21st in Dakota. 22nd, 7:35 a. m., was central near and west of Bismarck. That day it moved over Minnesota and north of Lake Superior. The pressure near the centre of the depression was about 0.5 inches below the normal. 22nd, the winds on Lake Superior and Michigan were high and southerly, with clear weather. All rain fell after the passage of centre, beginning in the Northwest on the 23rd; spread over the Lake region, Middle States and New England on the 24th.

No. X.—23rd, appeared at midnight report in western Wyoming. 24th, the centre moved along the Platte valley to Omaha. 25th, thence moved rapidly, in a northeast track, over Lake Michigan to the Georgian bay. 26th, 7:35 a. m., was central near Montreal; during the day moved up the St. Lawrence valley, and disappeared that night beyond our charts. The barometer at the centre of depression was generally 0.3 inches below the normal. Abundant rain fell south of its track, and mostly during the prevalence of the southerly winds. Cautionary Signals were ordered for this storm on the 24th for Lake Superior and on the 25th for the other lakes. The signals were justified on all the lakes. *Indiana.*—September 25th, Lebanon, 5 p. m., severe wind and rain-storm; buildings badly damaged and unroofed; two persons injured. Crawfordsville, 5 p. m., severe wind and rain-storm; buildings unroofed and flooded. Fort Wayne, 7 p. m., church struck by lightning and fired. Richmond, 7:30 p. m., heavy wind, followed by rain and lightning, damaging out-buildings and trees; railroad depot unroofed. *Illinois.*—Gilman, September 25th, destructive wind-storm; church and buildings badly damaged. *Michigan.*—September 25th, heavy storm washed away portion of C. and M. L. S. R. R. tracks near Coloma, (fifteen miles northeast of St. Joseph;) barn struck by lightning and fired in Walker township during afternoon.

No IX.—A low area appeared on the 27th, in Dakota. 28th, moved in a northeasterly track north of Pembina into Manitoba.

No. XII.—29th, moved over northern Nebraska. 30th, advanced in eastern Minnesota. The remainder of the track belongs to the October Review. The barometer near the centre of low area was frequently 0.6 in. below the normal. Frequent rain, seldom heavy, fell in advance of the storm centre. Signals were ordered in advance of the storm for Lakes Superior and Michigan on the 29th, for the other Lakes on the 30th. The storm was severe on Lake Michigan, and justified the Signals displayed there, but appears to have diminished in energy as it passed to the east.

INTERNATIONAL METEOROLOGY.

May 11th, 32° S., 22° W., severe cyclone.

June 2nd, 16° 56′ S., 76° 45′ E., sudden heavy gale. 15th, ship "East Lothian," from Calcutta to New York, reports continuation of NW. to SW. gales from Mauritius to Cape of Good Hope, which was passed June 15th. 17th, 55° 26′ S., 79° 26′ W., decks swept by heavy seas. 18th, Bark "Wakefield" to the westward of Madagascar Island on June 18th, encountered heavy W'ly gales and high confused sea, continuing to July 19th, when Cape of Good Hope was passed. Bark "Wakefield," Singapore to New York, September 15th, reported had strong E. winds up to June 22nd; in lat. 16° 56′ S., long. 76° 45′ E., had very sudden and severe gale during evening. 22nd, ship "Ross Dhu," off Algoa Bay, South Africa, WNW. gale, lasting until July 13th, vessel struck by heavy sea July 3rd, 36° S., 32° 20′ E.

July 4th, ship "Cosmopolis" wrecked on Staten Island, off Cape Horn, during hard WSW. gale, with thick snow. 13th, 35° 30′ S., 19° 04′ E., violent gale from NNE., increasing to hurricane and lasting six hours, with heavy cross seas. 14th, off Cape of Good Hope, strong westerly gales. 16th, Algoa Bay, Cape of Good Hope, SE. gale. 19th, 54° 33′ S., 53° 30′ W., during afternoon a heavy NE. gale set in, which continued with violence for eight days; 24th, 35° S., 24° 30′ E., heavy NW. gale, lasting 24 hours. 22nd, bark "Emma" totally wrecked during strong NE. breeze on E. bar of Sable Island. 25th and 26th, 39° S., 140° E., severe gale. 27th, Cape of Good Hope, SE. gale.